UDC 628.55

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ENVIRONMENTAL PROBLEMS AT THERMAL POWER PLANTS

The modern heat and power complex is a set of technical means, mechanisms and devices united into a single whole for its functional purpose and intended for receiving, converting, accumulating and transmitting various types of energy, as well as a complex engineering anthropogenic (technogenic or artificial) object, which is a multi-level system.

Thermal power facilities are sources of potential risk to the public and the environment. Energy facilities (fuel and energy complex) in terms of the degree of impact on the environment are among the most intensively affecting the biosphere.

The subjects of ecology, as is known, are the consequences of human activity. In this regard, from the point of view of ecology, the heat and power complex should be considered in several aspects. First, as an object artificially created by human hands - an anthropogenic or technogenic element (subsystem) in an ecosystem of a higher level - the natural environment, through which a person carries out his labor activity, having a direct and indirect impact on the state of the natural balance. Secondly, as an independent anthropogenic (technogenic) ecological system, which, in turn, is an artificially created environment for the activities of service personnel and is represented by a closed space consisting of a complex of rooms with different functional purposes with varying degrees of habitability? Thirdly, as a product of social labor, created for the receipt, transformation, accumulation, transmission and use of various types of energy in the required quantity and the required quality. Finally, as a powerful stationary anthropogenic planar source of environmental pollution.

The impact of thermal power plants on the environment largely depends on the type of fuel burned.

Solid fuel. When burning solid fuels, volatile ash with particles of unburned fuel, sulfur dioxide and sulfur anhydrides, nitrogen oxides, a certain amount of fluoride compounds, as well as gaseous products of incomplete combustion of fuel enter the atmosphere. Fly ash in some cases contains, in addition to non-toxic components, more harmful impurities.

Coal is the most common fossil fuel on our planet. Synthetic liquid fuels can be made from coal. However, the cost of such products is too high. The process takes place at high pressure. This fuel has one undeniable advantage - the presence of an octane number. This means that it is more environmentally friendly.

Peat. With the energy use of peat, there are a number of negative consequences for the environment resulting from the extraction of peat on a large scale. These include, in particular, violation of the regime of water systems, changes in the landscape and soil cover in places of peat production, deterioration of the quality of local sources of fresh water and pollution of the air basin, a sharp deterioration in the living conditions of animals. Significant environmental difficulties arise in connection with the need for transportation and storage of peat.

Liquid fuel. When burning liquid fuels (fuel oils) with flue gases, sulfur dioxide and sulfuric anhydrides, nitrogen oxides, vanadium compounds, sodium salts, as well as substances removed from the surface of boilers during cleaning enter the atmospheric air. There is no fly ash in the combustion products of liquid fuels.

Natural gas. When burning natural gas, nitrogen oxides are a significant pollutant of the atmosphere. However, the emission of nitrogen oxides from burning natural gas at thermal power plants is on average 20% lower than when burning coal. This is due not to the properties of the fuel itself, but to the peculiarities of combustion processes. The excess air coefficient when burning coal is lower than when burning natural gas. Thus, natural gas is the most environmentally friendly type of energy fuel and the release of nitrogen oxides in the combustion process.

Along with gaseous emissions, thermal power generation produces huge masses of solid waste; these include ash and slag.

Pollution and waste of energy facilities in the form of gas, liquid and solid phases are distributed into two streams: one causes global changes, and the other - regional and local. The same is true in other sectors of the economy, but still energy and the burning of fossil fuels remain the source of the main global pollutants. Pollution from thermal power plants enters the atmosphere, and due to their accumulation, the concentration of small gas components of the atmosphere, including greenhouse gases, changes. In the atmosphere there were gases that were previously practically absent in it - chlorofluorocarbons. These global pollutants have a high greenhouse effect and at the same time are involved in the destruction of the ozone screen of the stratosphere.

It should be noted that at the present stage, thermal power plants emit into the atmosphere about 20% of the total amount of all harmful industrial waste. They significantly affect the environment of the area of their location and the state of the biosphere as a whole. The most harmful condensing power plants running on low-grade fuels.

Wastewater from thermal power plants and storm drains from their territories, contaminated with waste from technological cycles of power plants and containing vanadium, nickel, fluorine, phenols and petroleum products, when

discharged into water bodies, can affect water quality and aquatic organisms. Changes in the chemical composition of certain substances lead to a violation of the habitat conditions established in the reservoir and affect the species composition and number of aquatic organisms, which ultimately can lead to violations of the processes of self-purification of water bodies from pollution and to the deterioration of their sanitary condition.

The so-called thermal pollution of water bodies with various violations of their condition is also dangerous. TPPs produce energy using turbines driven by heated steam. During the operation of the turbines, it is necessary to cool the waste steam with water, so the flow of water continuously departs from the power station, usually heated by 8-12 ° C and discharged into the reservoir. Large thermal power plants need large volumes of water.

The heating zone formed at the confluence of the warm "river" is a kind of section of the reservoir in which the temperature is maximum at the point of the spillway and decreases as it moves away from it. Heating zones of large thermal power plants occupy an area of several tens of square kilometers.

As a result of increasing temperatures in the reservoir and violating their natural hydrothermal regime, the processes of "flowering" of water intensify, the ability of gases to dissolve in water decreases, the physical properties of water change, all chemical and biological processes occurring in it are accelerated, etc. In the heating zone, the transparency of water decreases, the pH increases, the rate of decomposition of easily oxidizing substances increases. The rate of photosynthesis in such water decreases markedly.

In the system of properties of the heat and energy resources, environmental safety is a special property, which is due to a number of objective reasons. First, it manifests itself at almost all stages of the life cycle of the complex: during construction, operation and disposal. Secondly, this property is realized when performing the absolute majority of tasks (in the production, transformation, transmission, accumulation and use of various types of energy, etc.). Thirdly, this property, like no other, is closely related to other properties of the fuel and energy resources (for example, with maneuverability, reliability, efficiency, security, etc.), improving or worsening them, ultimately determining the quality of the fuel and energy, and consequently, the effectiveness of its use as a whole.

Indeed, heat and gas pollution, noise, vibration, radiation of various nature are the cause of deterioration of the habitat of the internal premises of the fuel and energy system, changing the working conditions of service personnel and having a significant impact on the ability of people to perform their duties qualitatively. They also worsen the environmental situation in the area of the location of the enterprise of the energy and energy and the region as a whole.

The most closely environmental safety of the enterprise is connected with its efficiency, since the resources available, not used for their intended purpose, as well as used irrationally, eventually are discharged into the environment in the form of waste and are environmentally hazardous pollutants.

The development of the country's environmental legislation and the tightening of its provisions, and consequently, the requirements based on it, imposed on technical facilities of various purposes, scale and subordination, one way or another, make us pay attention to solving environmental problems, and not only in the energy sector. The experience of world economic development shows that underestimating or ignoring the property of "environmental security", in the end, always leads to the transformation of entire regions of the planet into uninhabited territories.

In order to reduce the environmental impact of traditional methods of energy production, science and production are exploring the possibilities of obtaining energy from alternative resources, such as wind, solar, geothermal and wave energy and other sources, which are inexhaustible and environmentally friendly.

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